2016 Fall Outlook for Central & Northern New Mexico

After El Niño rapidly weakened in late spring and early summer, attention turned to a possible transition to La Niña conditions by late summer or early fall. Where are we now and how will sea surface temperature anomalies in the eastern equatorial Pacific Ocean impact the weather in central and northern New Mexico this fall season?

Current Conditions Compared to Similar Past El Niño Events

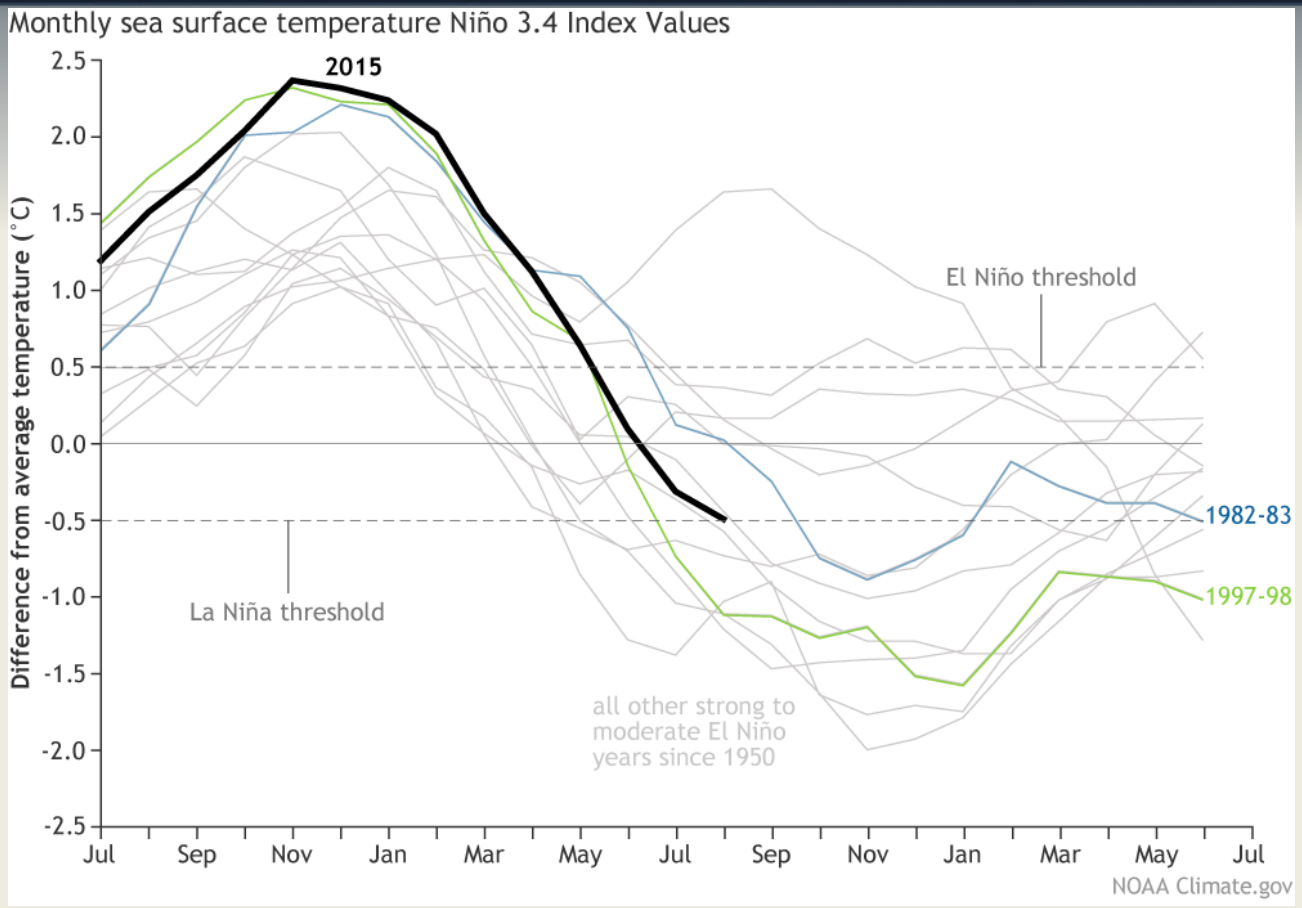
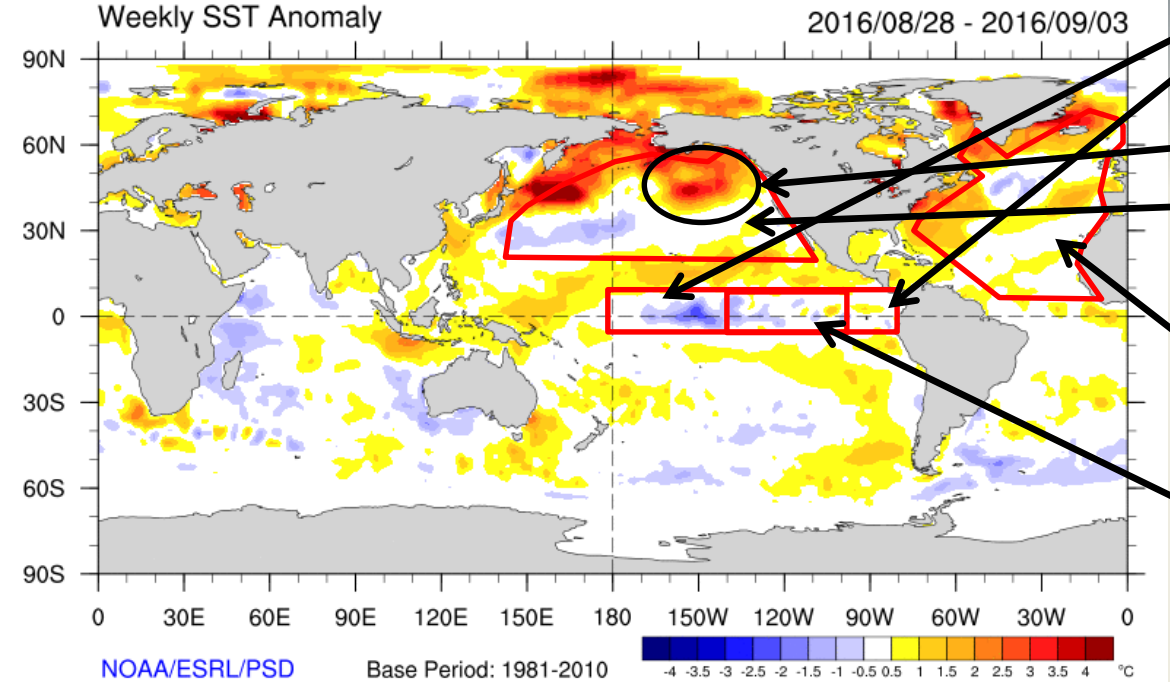


Figure 1. Monthly Oceanic Niño Index (ONI) values compared with moderate to strong El Niño years since 1950. 2015-16 El Niño is in between the two closest analog years, 1982-83 and 1997-98. Note that ONI values must average -0.5°C or below over a 3-month period in order for La Niña conditions to be met.

Latest Sea Surface Temperature Observations & Oceanic Oscillation Index Values



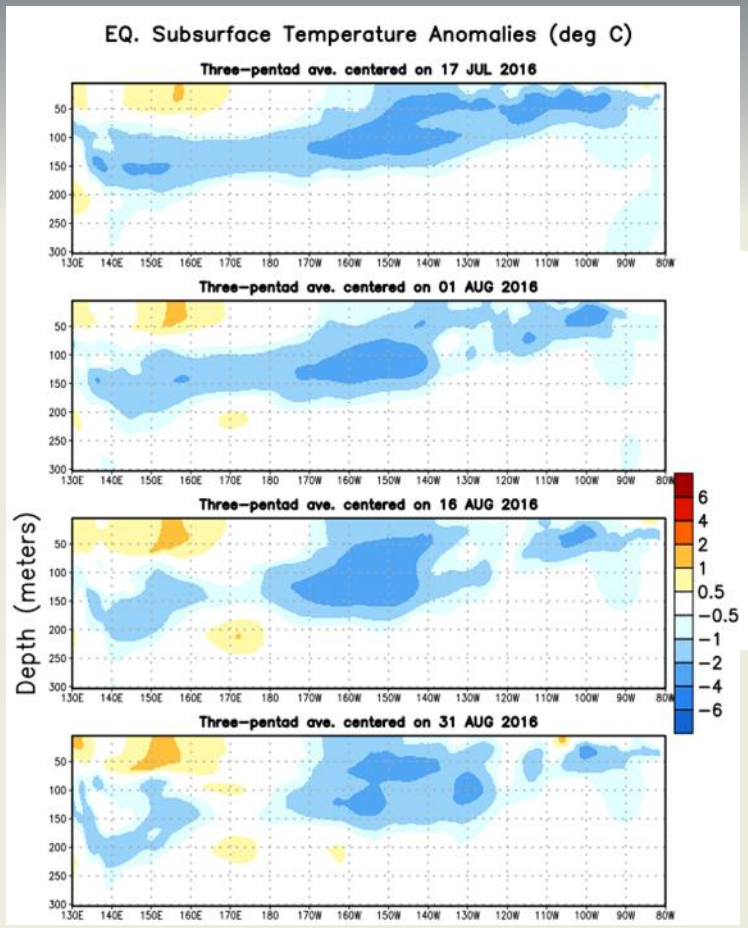
- Multivariate ENSO Index (MEI) for JUL-AUG 2016: +0.175↓

Warm "blob"

- Pacific Decadal Oscillation (PDO) for AUG 2016: +0.52↓
- Atlantic Multidecadal Oscillation (AMO) for AUG 2016: +0.15↑
- Oceanic Niño Index (ONI) (uses Niño 3.4 region) for JJA 2016: -0.3↓

Figure 2. Cooling SSTs in the Equatorial Pacific Ocean have slowed recently. Climate models have also cooled on their prediction of La Niña conditions by fall. Why is the PDO index dropping so rapidly during the past several months? As is typical after a strong El Niño, the wind and weather patterns over the North Pacific underwent a dramatic shift between December 2015-April 2016 and May 2016-August 2016. The surface pressure pattern changed from an El Niño fueled intense Aleutian Low to a anomalously weak Aleutian Low and strong North Pacific High. This atmospheric forcing pattern causes the PDO index to decline quite rapidly. As the Aleutian low strengthens again in October and November (ON), PDO index values are expected to rise/become more positive.

Sub-surface Observations



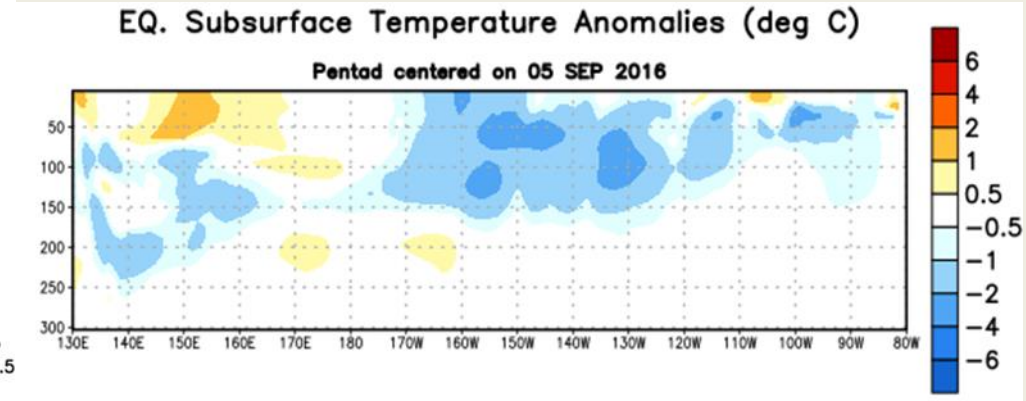


Figure 3. Sub-surface Equatorial Pacific plots showing that the area of cooler than average water from mid summer has been slowly modifying with time.

Analog Years

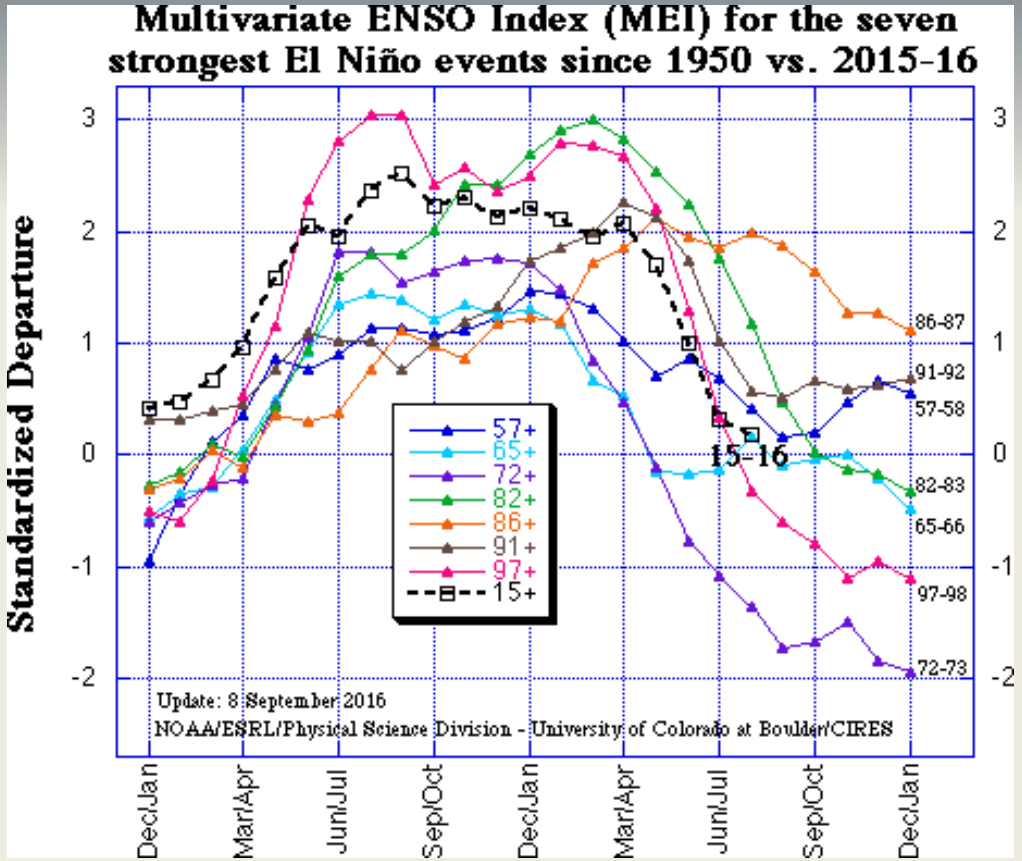


Figure 4. The transition from a strong to extreme El Niño event makes identifying analog years relatively easy. The fall of 1983 and 1998 are the only two years that closely compare when looking at MEI, Oceanic Niño Index (ONI) and the Pacific Decadal Oscillation (PDO).

October and November (ON) Precipitation After Strong El Niño events vs. 30-yr Avg.

Green = Above 30-yr Avg Brown = Below 30-yr Avg.

Site	81'-10' avg Oct-Nov	1998 Oct-Nov	1983 Oct-Nov
ABQ	1.59"	2.26"	1.64"
Santa Fe	2.26"	4.10"	1.83"
Clayton	1.64"	3.71"	0.68"
Gallup	1.86"	3.07"	2.09"
Las Vegas	1.94"	4.79"	1.32"
Roswell	1.82"	6.13"	4.95"
Chama	3.96"	6.67"	4.91"
Eagle Nest	1.90"	4.31"	0.93"
Los Alamos	2.53"	4.68"	1.60"
Taos	1.87"	3.38"	2.04"
Wolf Canyon	3.44"	6.38"	4.31"
Carrizozo	2.14"	4.29"	3.70"
Luna R. S.	2.62"	4.41"	4.63"
El Morro	2.00"	4.24"	2.43"
Sandia Park	3.06"	4.34"	M

Figure 5. All sites were above to well above average in ON of 1998 while the majority of sites were above average in ON of 1983.

Graph of Precipitation Data

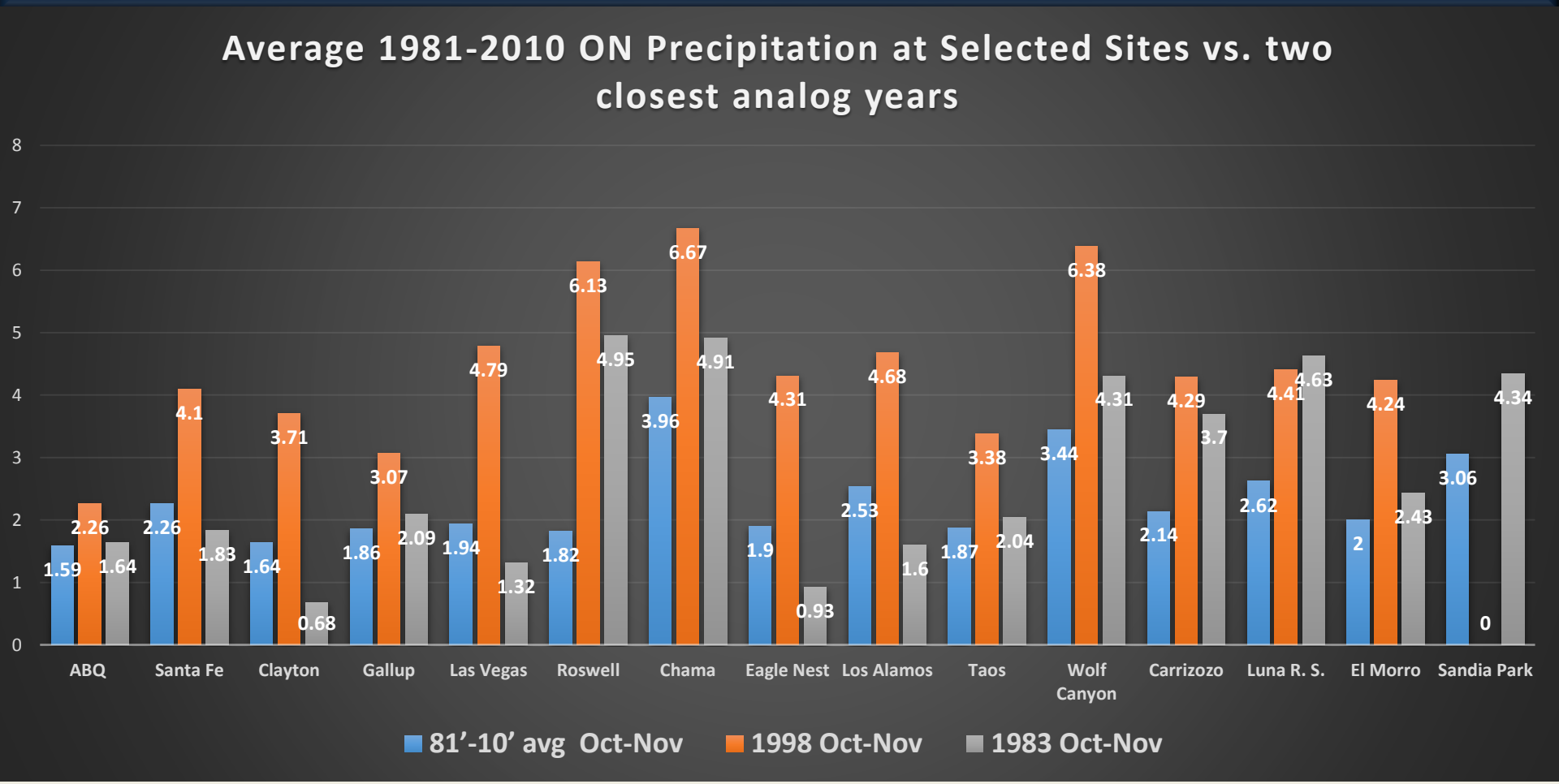


Figure 6. Graphical representation of data from Figure 5. To reiterate, most sites were above to well above their 30-year climatological averages during the two closest analog years.

October-November Snowfall

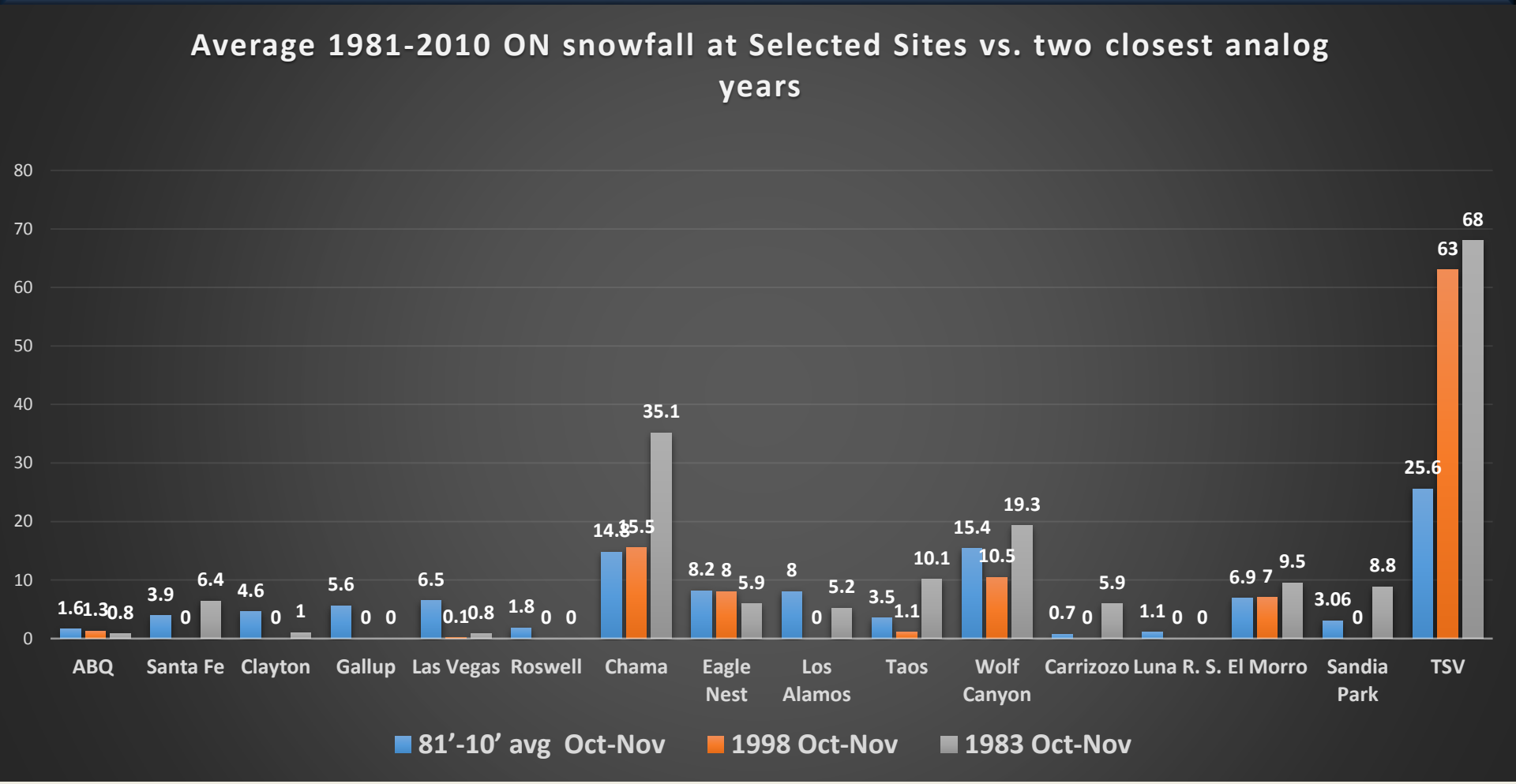
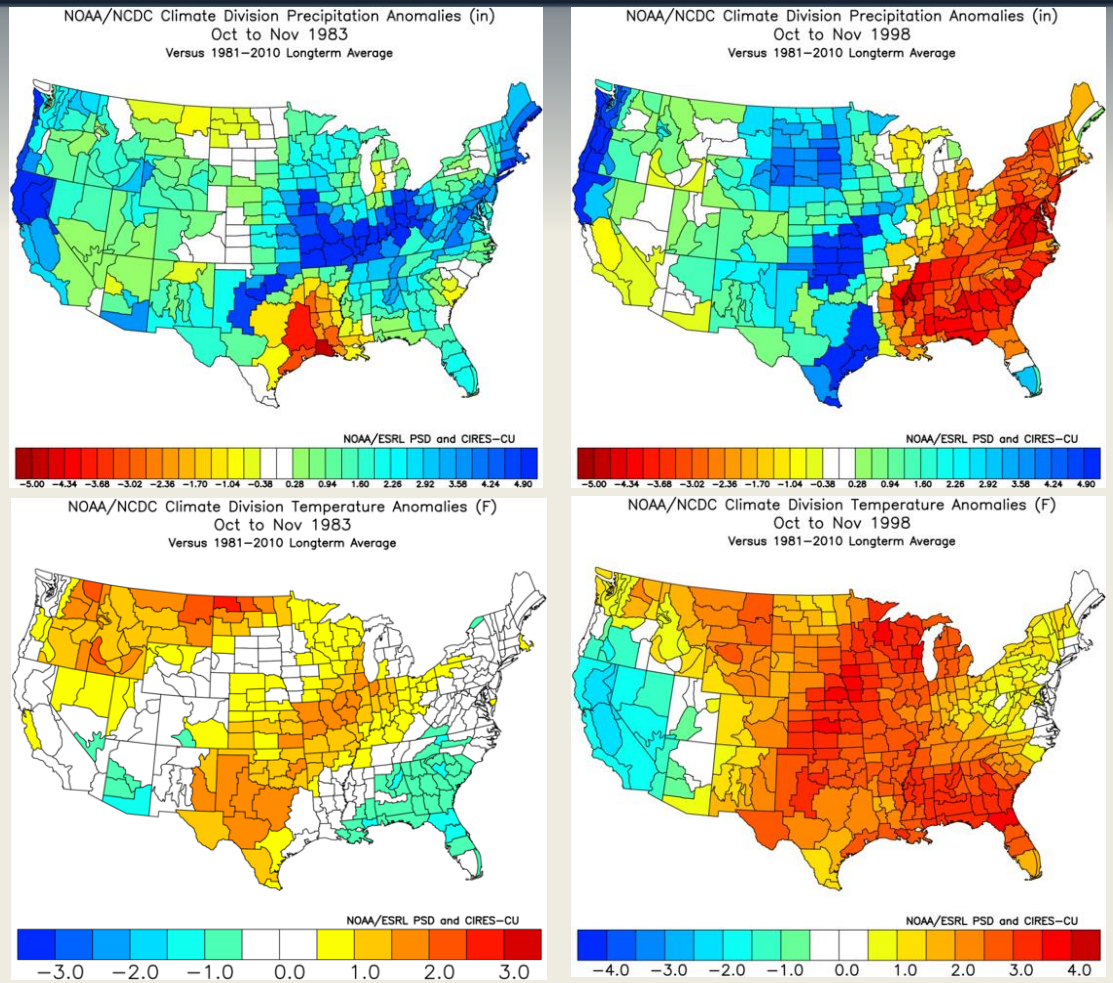


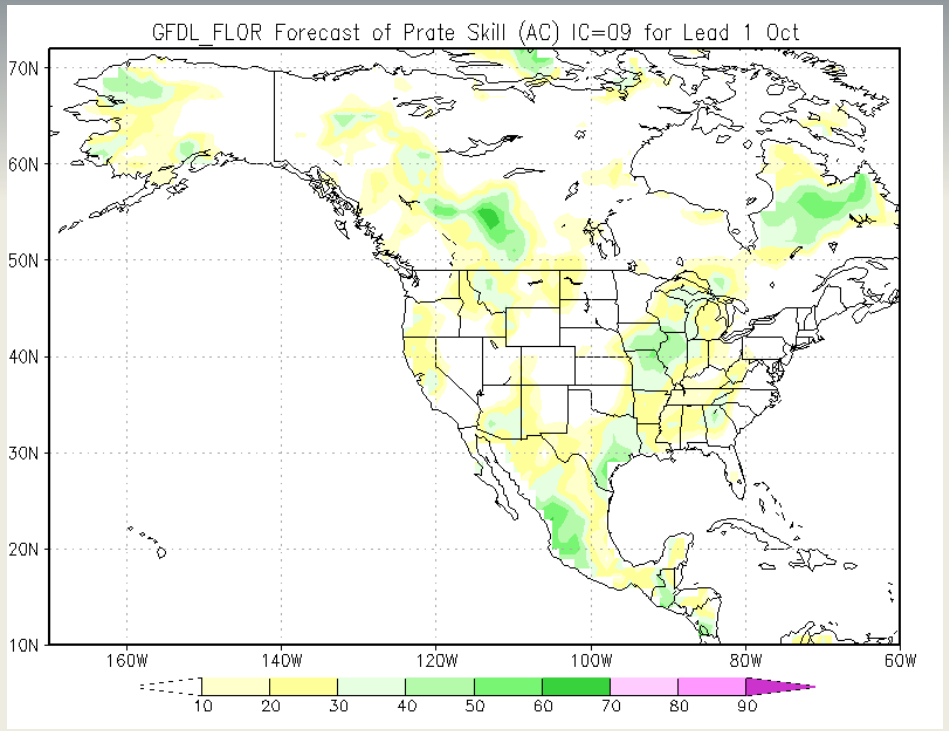
Figure 7. Comparing 1981-2010 ON average snowfall to snowfall in ON 1983 and 1998. Higher elevation sites received above to well above average snowfall during theses two analog years. Majority of lower elevation sites received below average snow amounts suggesting the storms systems which brought precipitation in ON 1983 and 1998 were warmer than average.

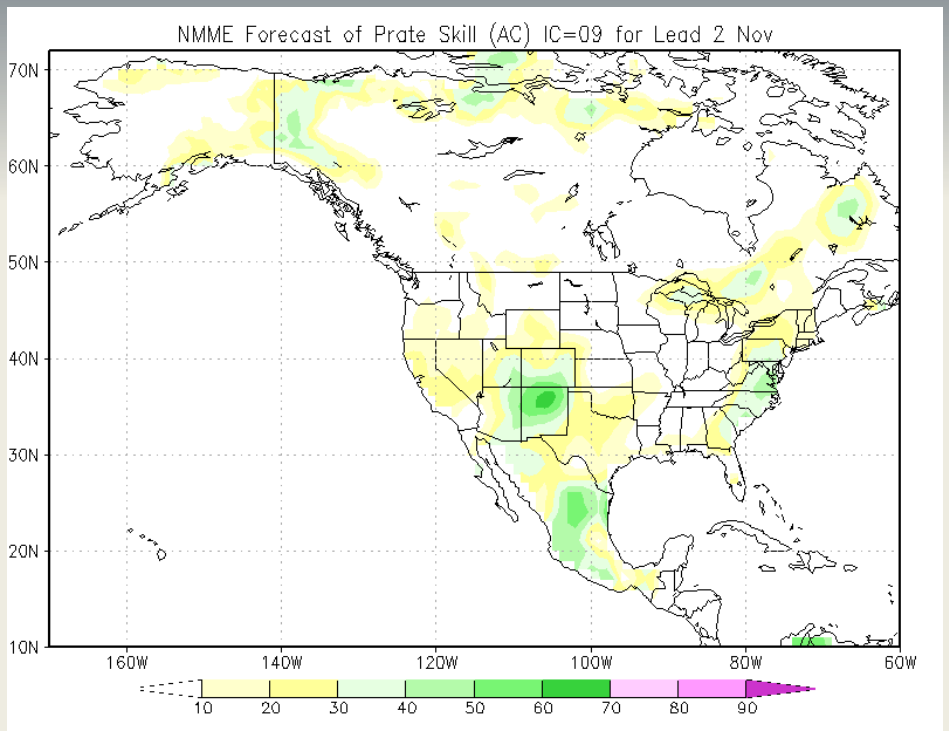
Precipitation and Temperature Anomalies from ON 1983 and 1998 following El Niño



Figures 8-11. Anomaly plots for CPC's climate divisions comparing ON precipitation and temperature after strong El Niño events (1983 & 1998) with 30-year climatological averages. All climate divisions in New Mexico are near to slightly above average for precipitation in ON while temperatures ranged from near to slightly above average.

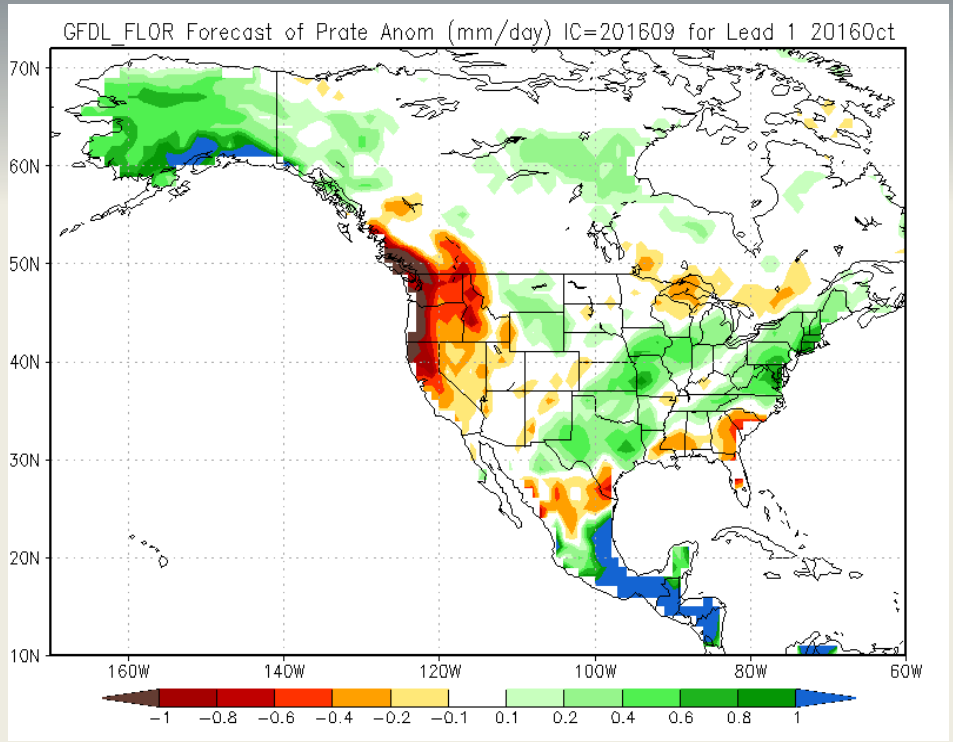
Climate Model Skill Scores

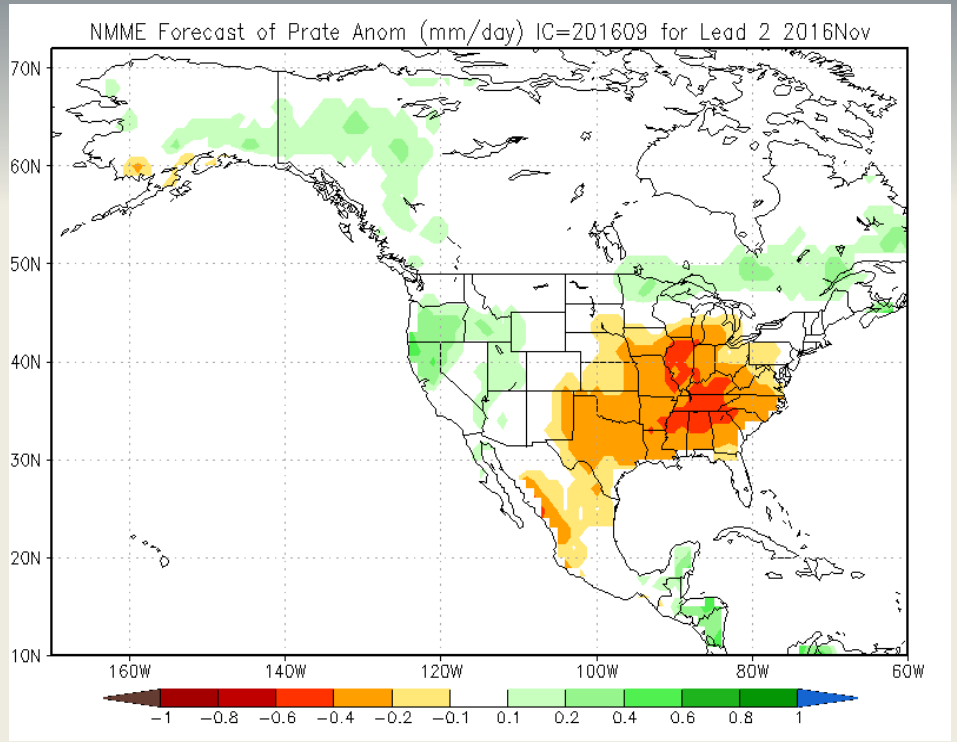




Figures 12 & 13. Geophysical Fluid Dynamics Laboratory (GFDL) and the North American Multi-model Ensemble (NMME) climate model skill scores for October and November. These two climate models have the highest skill scores with regard to precipitation forecasts in New Mexico during October and November.

Climate Model Forecasts





Figures 14 & 15. Precipitation rate (millimeters per day) anomaly forecasts for October (left) and November (right) 2016 from the two most skilled climate models for New Mexico. Note that the GFDL model predicts slightly above average precipitation over southeast New Mexico in October while the NMME forecasts slightly below average amounts across the far eastern plains in November. Both models favor near average precipitation across western and central New Mexico in ON.

Climate Model Forecasts

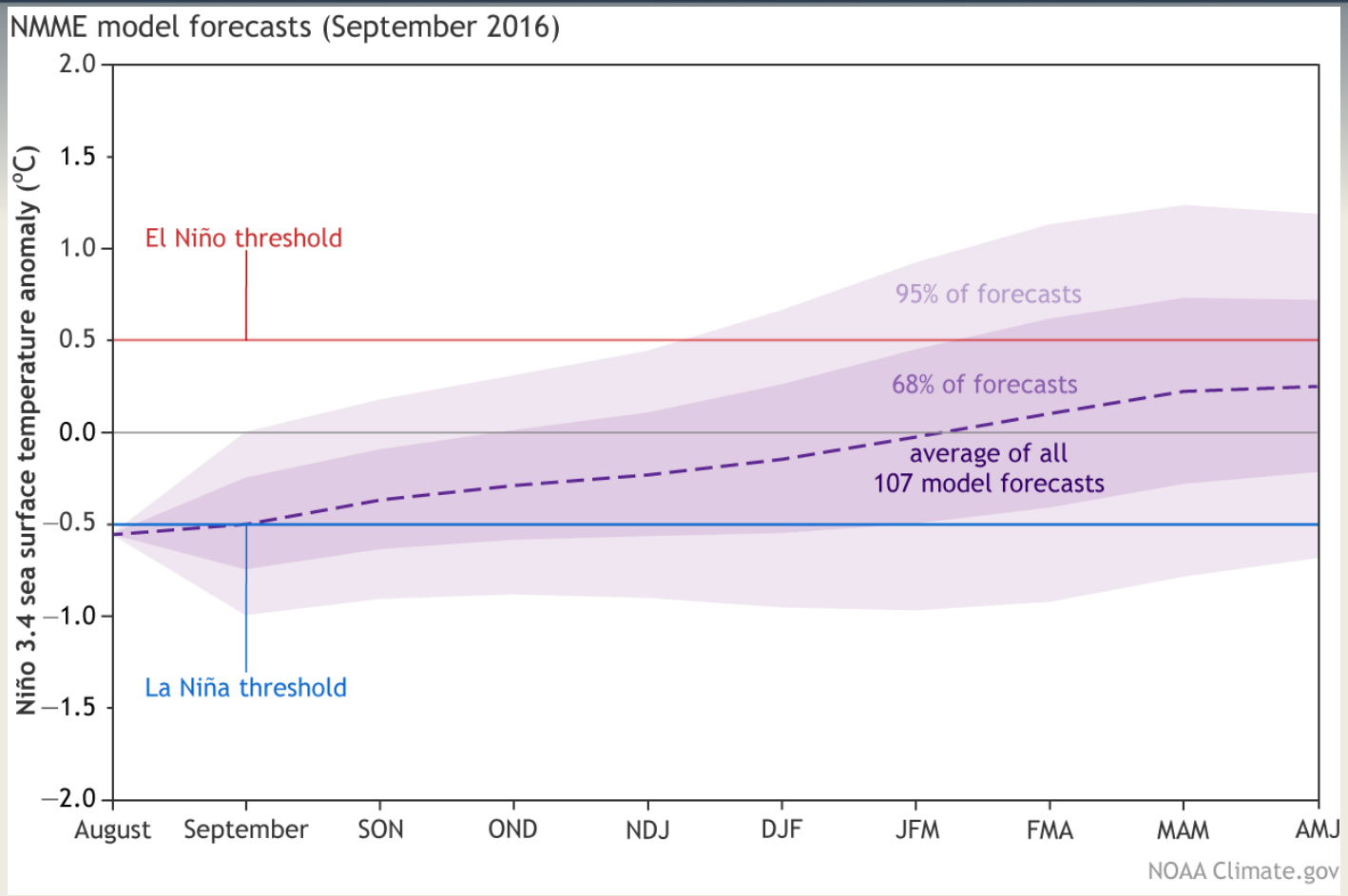


Figure 16. The climate model trend regarding SSTA forecasts in the Niño 3.4 region during the summer months has been warmer, lessening the chances of a La Niña developing during autumn or early winter and favoring neutral conditions.

Fall Precipitation & Temperature Outlook from CPC

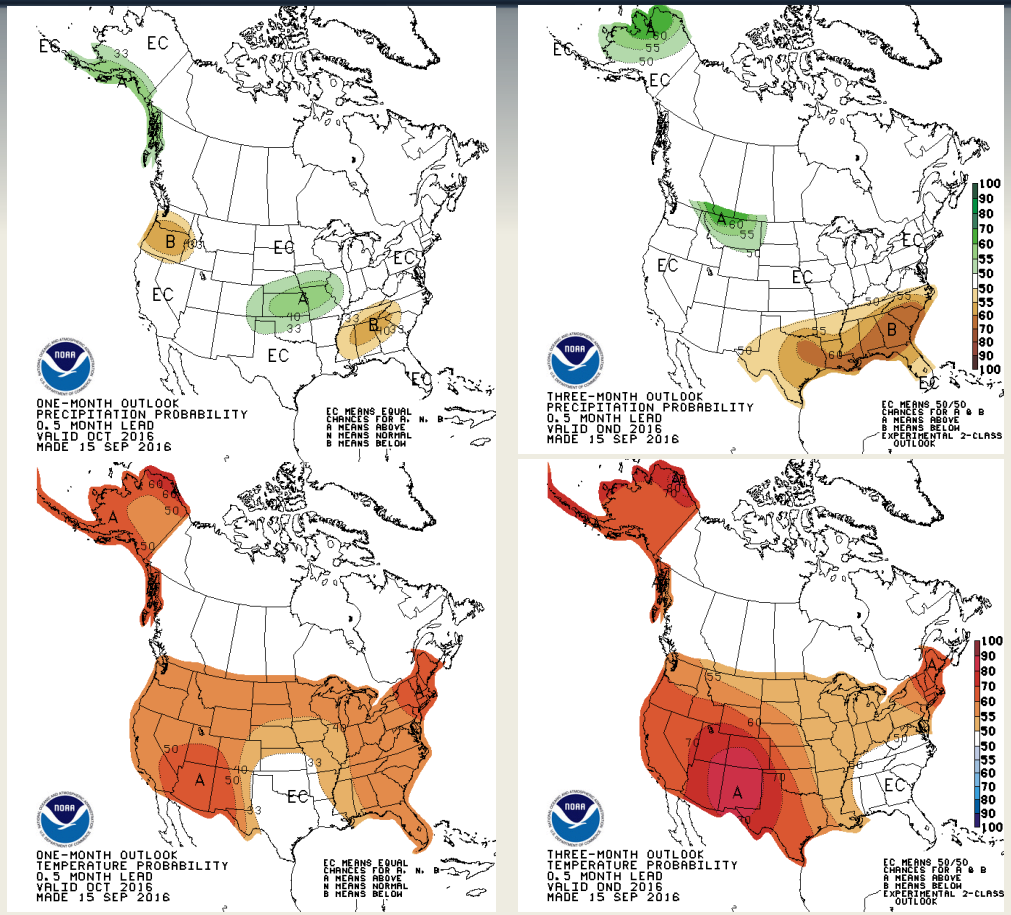
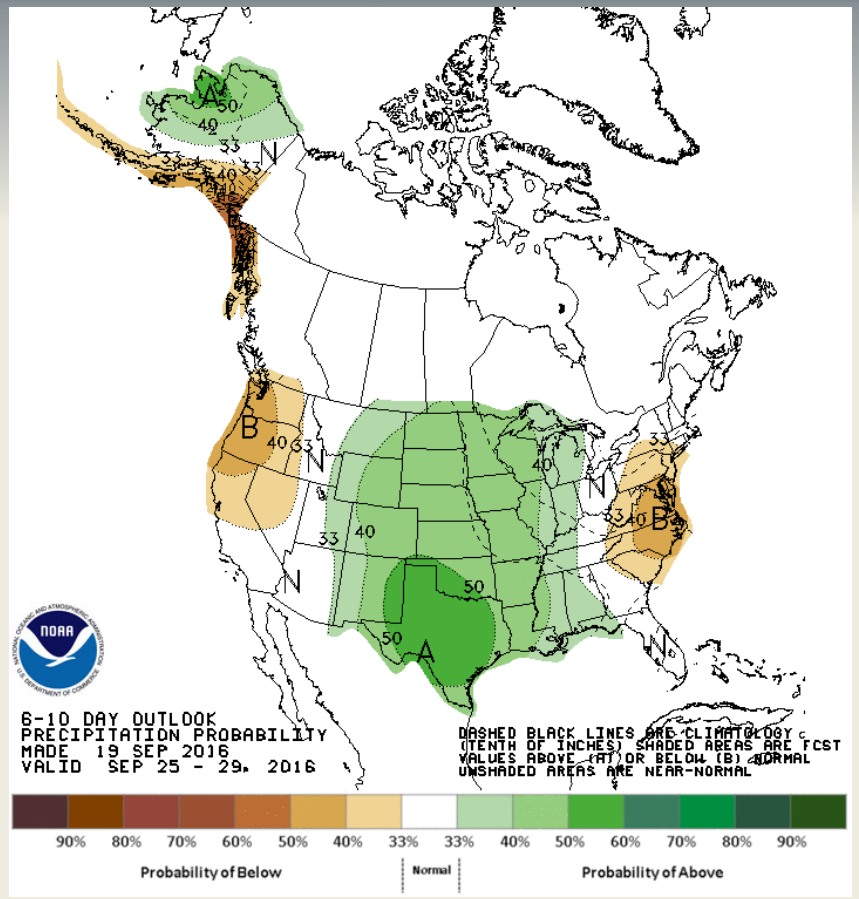


Figure 17-20. Climate Prediction Center's 2016 October Temperature and Precipitation Outlook (left) and October-November-December Temperature and Precipitation Outlook (right) which incorporate both dynamical climate prediction model data as well as previous precipitation and temperature statistics to derive a seasonal forecast. In general, near average chances for precipitation are forecast for the southwestern United States. Slightly higher to higher chances for above average temperatures are forecast for New Mexico in ON 2016.

How about the Rest of September?



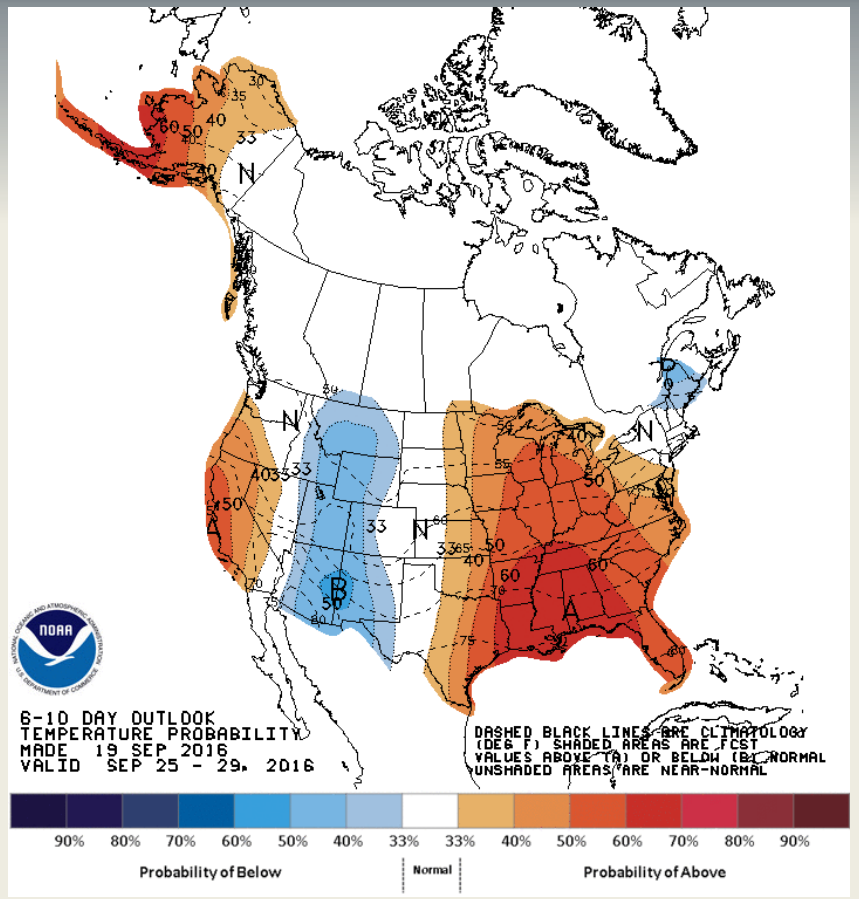


Figure 21 & 22. Medium Range Global Numerical Weather Prediction Models suggest that probabilities are greater than average that precipitation during the remainder of September will be above seasonal averages, especially across eastern NM. With regard to temperature, models indicate that probabilities are better than average that temperatures will be below seasonal averages, especially across western NM.

Summary

- Warm "blob" in the northeast Pacific Ocean is most likely the result of the Ridiculously Resilient Ridge or RRR and not the other way around. As such, the warm "blob" (Figure 2) is not expected to significantly impact the weather or climate in New Mexico.
- While a strong La Niña developed closely following the 1997-98 El Niño, there was nearly a year of slightly-below-average/neutral SSTs following the 1982-83 El Niño before a moderate La Niña ultimately developed the following year, further indication that there are many paths that the climate system can follow after a strong El Niño event.
- Precipitation in previous fall (ON) seasons after strong/extreme El Niño events since 1950, namely 1983 and 1998, ranged from slightly below average to well above 1981-2010 climatological averages at sites throughout northern and central New Mexico.
- Precipitation data from the two most analogous years to 2016 (1983 & 1998) combined with forecasts from the most highly skilled climate models indicate that precipitation in central and northern New Mexico during October and November will most likely be near to slightly above 1981-2010 climatological averages, following more closely to ON 1983 precipitation.
- Snowfall data from the 2 previous years following strong/extreme El Niño events combined with climate model forecasts suggest that snowfall will range from near to slightly above average in October and November, particularly in the higher elevations of the northern mountains favored by orographic effects.
- Temperature data from the two closest analog years combined with forecasts from climate models indicate that temperatures will most likely be slightly above 1981-2010 averages.
- *The 2016-17 meteorological winter (Dec-Feb) Outlook for Central and Northern New Mexico will be out in mid to late October.

Outlook Information

- **Outlook provided by National Weather Service Forecast Office Albuquerque, NM.**

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